WINDTRACER®

INCREASING FLIGHT SAFETY WHILE BOOSTING AIRPORT EFFICIENCY

LOCKHEED MARTIN

We never forget who we're working for®

WINDTRACER - DOPPLER LIDAR

The Lockheed Martin WindTracer® light detection and ranging (LIDAR) system provides the aviation community with reliable measurements of wind hazards and wake turbulence to optimize safe flight operations.

Since initial deployment in 2002 at Hong Kong International Airport, WindTracer successfully operates at major airports worldwide in Asia, North America and Europe.

AIRCRAFT WAKE VORTICES

Aviation safety organizations use Lockheed Martin's WindTracer to facilitate increased airport capacity by detecting and tracking aircraft wake vortices. All aircraft generate wakes – the larger the aircraft, the stronger the wake – and wakes from a leading aircraft can jeopardize the safety of aircraft trailing it. WindTracer measures winds behind aircraft to provide information on the strength and behavior of wakes. By applying wake information, measured by WindTracer for hundreds of thousands of aircraft arrival and departure events, aviation safety organizations determine the minimum safe separations for aircraft departing and arriving at airports.

These organizations have based flight rules on the minimum safe separations, thereby maximizing the throughput of incoming and outgoing aircraft while maintaining safe flight operations.

The United States Federal Aviation Administration (FAA), Eurocontrol, and the Dubai Air Navigation Service have been pioneers using WindTracer to improve airport throughput while maintaining safe aircraft separations. The FAA has applied millions of wake measurements made by Lockheed Martin's WindTracer to redefine flight rules, resulting in major efficiency enhancements at U.S. airports.

WIND HAZARD DETECTION

WindTracer detects and tracks hazardous wind conditions such as low-level wind shear associated with microbursts and gust fronts. The system supports air traffic control and meteorological personnel with displays and alerts of wind shear in real-time. Wind shear is defined as a change in wind speed or direction over a relatively short distance, which is hazardous during takeoff and landing due to its effect on aircraft performance and control.

WindTracer alerts are vital when wind shear occurs, allowing air traffic personnel to provide timely information to pilots prior to encountering hazardous conditions. WindTracer is particularly effective at providing accurate wind information in clear and dry air, making it complementary with weather radar, which operates best in wet air.

Continuously scanning the approach and departure corridors, WindTracer transmits eye-safe pulses of infrared light into the atmosphere and receives returned light that has reflected off of naturally occurring dust particles suspended in the air. By comparing the frequency of the transmitted and received light, WindTracer derives the wind speed and direction.

For wind hazard detection, WindTracer is configured to scan in all directions around the airport to a distance as great as 15 km. In addition to being able to detect wind shear from these scans, air traffic managers are given advance notice of frontal passages and wind direction shifts, allowing for more efficient airport configuration changes that can minimize holding and excessive redirecting of aircraft. This enables more efficient arrival and departure management, improving the passenger experience for flights worldwide.

FEATURES & BENEFITS

- Detailed wake measurements for minimized, safe aircraft separation intervals
- Real-time detection and alerting of wind hazards for enhanced flight safety

WINDTRACER SPECIFICATIONS*

Measurement:
- Typical Range: 300 m to 15 km
- Maximum Range: 33 km
- Radial Wind Velocity Range: ±40 m/s
- Suggested Minimum Distributed Aerosol Resolution: 100 m

Scanner:
- Azimuth Range: Unlimited (incorporates slip rings for continuous rotation)
- Elevation Range: Unlimited (incorporates slip rings for continuous rotation)
- Pointing Accuracy: Azimuth: ±0.014°, Elevation: ±0.040°
- Scanner Resolution: 0.001°
- Optical Clear Aperture: 12 cm

Transceiver:
- Laser Wavelength: 1617 nm
- Pulse Energy: 2.5 ± 0.5 mJ
- Pulse Duration: 250 ± 50 nsec
- Pulse Repetition Frequency: 750 Hz
- Beam Diameter: 9.6 cm (e^{-1} intensity width)

Equipment Shelter:
- Environment: All weather

Standard Shelter:
- Weight: 1630 kg
- Dimensions: Base: 144 x 196 cm
- Height: 181 cm (270 cm with lightning rods installed)

Large Shelter:
- Weight: 2550 kg
- Dimensions: Base: 197 x 244 cm
- Height: 249 cm (330 cm with lightning rods installed)

Power Specification:
- 200 to 240 VAC, single phase, 50 or 60 Hz, 50 Amp service

*Specifications are subject to change

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Lockheed Martin
Louisville, Colorado
(303) 729-5412

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